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SWEET CLOVER (*Melilotus alba*).

Sweet clover, which is so common along roadsides and in waste places throughout the United States, was introduced into this country from the Mediterranean region of Europe. It is occasionally called Bokhara clover, "melilotus," and "melilot." The biennial yellow-flowered species (*Melilotus officinalis*) and the small annual yellow-flowered species (*Melilotus indica*), which is found in the South and Southwest, are also called sweet clover, but the white-flowered species is more common and better adapted to cultivation, owing to its greater vigor. The small annual yellow-flowered sweet clover is practically valueless as a forage crop in the Northern States, especially on account of its small growth. The white-flowered species is ordinarily referred to as sweet clover, while the other two species are called yellow clover.

White sweet clover is a biennial leguminous plant, growing to a height of from 3 to 8 feet and branching freely when the stand is not too thick. It resembles alfalfa when young, but can be distinguished from it by its bitter taste, the smooth, shiny leaves, and later, when in bloom, by the long, loose racemes of white flowers in contrast to the close purple clusters of alfalfa flowers.

One of the most notable features of sweet clover is its root system. During the first season of growth the roots of the young plants develop to a large size, striking deep into the soil and becoming quite fleshy. They often reach a diameter of one-half inch at the crown of the plant. Sweet clover has a central taproot, which branches much more freely than the taproot of alfalfa. On account of the fleshy character of the roots, a large quantity of vegetable matter is added to the soil, even when the tops of the plants are removed for hay.

USES OF SWEET CLOVER.

Sweet clover was used as a feed for animals at least 2,000 years ago, but until recent years its most prominent use was as a soil improver. However, at the present time, in addition to being a valuable

soil improver it is gradually gaining in favor as a hay and pasture crop. Being a biennial plant it is well adapted to short rotations. It is especially valuable as a honey plant, furnishing nectar for bees over a long period.

Sweet clover as a soil-improving crop.—As a soil-improving crop there appears to be no other plant which so quickly puts waste land or run-down farms into condition for producing crops. The value of sweet clover for this purpose is recognized in Alabama and Mississippi, and also in parts of Kentucky. On account of the great root development of this plant, extremely large quantities of vegetable matter are returned to the soil when a field of sweet clover is turned under. The root system alone has been estimated at about 20 tons of green weight per acre in a good growth of sweet clover. The decay of the fleshy roots at the end of the second year, when the plant itself dies out, not only furnishes a large quantity of humus, but also opens up the lower layers of the soil and provides a passage for water and air into the subsoil. In some parts of the country it has been used in a small way as a green-manure crop, the second year's growth being plowed under. By turning under a crop of sweet clover or only the roots and stubble, marked gains are obtained in the following crops.

Sweet clover is a very good winter cover crop to prevent soils from gullying and washing. It also takes up a large amount of available fertilizers which would otherwise leach out during the winter. On account of the large taproots of sweet clover, not only are fertilizers kept from leaching from the upper layers of the soil, but potassium and phosphorus are also taken up in the subsoil and deposited, at least in part, in the surface soil when the roots decay. In addition to this a large amount of vegetable matter is added to the soil.

Sweet clover in rotations.—Since sweet clover is a biennial, it is better adapted than alfalfa to short rotations. Seeded in the early spring, either alone or with a nurse crop, it produces its largest growth the following season and is ready either to turn under as a green-manure crop or to be utilized as a pasture or hay crop. In this respect it is similar to red clover. This feature allows it to be used in short rotations with most farm crops. On many soils where alfalfa does not thrive sweet clover has proved to be an excellent substitute.

Sweet clover as a hay crop.—Sweet-clover hay is rapidly coming into favor as a feed for all classes of live stock, especially in places where more valuable types of hay will not grow successfully. Ordinarily, some trouble is experienced in getting stock to eat sweet clover at first, on account of its bitter taste, but after they have been accustomed to eating it, no trouble is experienced. The substance which

causes this bitter taste, cumarin, volatilizes to a considerable extent when the hay is curing, so that the hay loses much of its bitter taste.

Sweet clover as a pasture crop.—Sweet clover makes excellent pasture for horses, sheep, cattle, hogs, and chickens. Probably the easiest way to create an appetite for this plant is to commence pasturing the stock on it very early in the spring of the second year, before other green feed has started. A sufficient number of animals should be kept in a sweet-clover pasture to keep it grazed closely. This will prevent the stems from becoming large and woody and will also induce an abundant growth of young shoots. Stock when pastured upon sweet clover make gains which compare very favorably with those obtained from either alfalfa or red clover. More rapid gains in flesh are made, however, if a light daily grain ration of about 1 pound of grain per hundredweight of live stock is fed in addition to the pasturing.

There is very little danger of bloating when stock is pastured on sweet clover, but it is safest to avoid turning the stock into a sweet-clover pasture when it is wet with dew or rain or when stock is unusually hungry. Sweet clover will also thrive well during midsummer droughts and produce much early and late pasturage.

SOIL REQUIREMENTS.

Sweet clover has the ability to thrive on poor clay soils as well as on poor sandy soils, but it will make a better growth on fertile soil. It prefers soils of limestone origin. Clay soils which are acid should be limed before sweet clover is sown. In the limestone soils of Alabama, Mississippi, and parts of Kentucky it grows freely and is quite widely used, while on the adjoining clay soils little is found. Sweet clover is also very resistant to alkali, and plants may be found in the West growing on soils so alkaline that little else than salt grass is able to survive.

PREPARATION OF THE SEED BED.

The primary requisite for obtaining a stand of sweet clover is to have a firm, thoroughly compacted seed bed with just enough loose soil on top to enable the seed to be covered. The lack of a solid seed bed is probably the chief reason why sweet clover so often fails when seeded under cultivation. When sweet clover is seeded in the spring on winter wheat the seed bed is usually in good condition. However, if it is seeded with spring-sown grain the seed bed should be rolled after seeding. Better results are usually obtained where sweet clover is seeded alone in the late winter or spring on ground which has been plowed and thoroughly worked the previous fall.

SEEDING.

The time for sowing sweet clover varies considerably in different sections of the United States. In the eastern part, in the latitude of Washington, D. C., a good stand can be obtained by seeding either in early spring or about August 15. One disadvantage with early fall seeding is that the plant matures and dies the following year and only a small growth of roots is obtained. Seeding in late winter or early spring is to be recommended, since the sweet clover if seeded alone will make one cutting of hay the year it is seeded, and will produce either two cuttings of hay or one hay crop and one seed crop the second year. If seeded with a nurse crop it will develop an extensive root system the first year and produce a small amount of pasture. For this reason it is recommended that so far as possible it be seeded in the late winter or spring. In the Southern States, as far north as the Ohio River, the practice is to seed quite early in the spring, during February or the early part of March. In the States farther north than this the date is correspondingly later, until in Wisconsin it is usually seeded in the latter part of April or first of May. When the rainfall is sufficient, a stand can be obtained by seeding in small grain, such as fall wheat or spring-sown crops like oats and barley, but in seeding with grain one runs some risk of having the sweet-clover plants killed out by drought during the summer. Owing to the rather slow germination of the seed it is usually best to seed at the rate of about 20 to 25 pounds of hulled seed and 30 pounds of seed in the hull. The slow germination of sweet-clover seed is largely due to the presence of a considerable quantity of hard seed. If this hard seed can be treated to make it germinate promptly, a third less seed may be used.

In some arid sections the seed should be sown very early in the spring, or as soon as there is enough moisture in the ground. At least a part of the seeding should be made in rows 42 inches apart, so that it can be cultivated the same as corn. This insures a much better growth in droughty seasons.

In the sandy soils of northern Nebraska, as well as in western Iowa, sweet clover is seeded to some extent on land previous to seeding alfalfa, since it provides the inoculation so badly needed for the success of alfalfa and also improves the physical properties of the soil.

INOCULATION.

On poor soils in localities where sweet clover is not common, it is quite important that the soil be inoculated at seeding time to insure good results. Even in localities where sweet clover is plentiful the early growth has been made much more vigorous by thoroughly inoculating the soil. Inoculation can be accomplished by mixing

soil from a field where sweet clover, bur clover, yellow trefoil (black medic), or alfalfa grows abundantly, pound for pound, with sweet clover seed. This mixture should be sown after sunset or on a cloudy day and immediately harrowed in, since sunlight greatly injures the inoculating germs. Inoculation is also accomplished in the South by using hulled seed. Pure cultures of the inoculating bacteria may be obtained free of charge from the United States Department of Agriculture.

HARVESTING.

When hay is desired, sweet clover should be cut just before it begins to bloom. At this time the leaves are most abundant, and the stems have not yet become woody. The principal difficulty in utilizing sweet clover as a hay crop is the fact that it is very difficult to cure it successfully. Sweet-clover hay should be tedded while in the swath, and just before the leaves become dry enough to shatter it should be raked into windrows. After lying in the windrow for a day it may be put into shocks and cured. When sweet clover is seeded in the spring with a nurse crop, only a small amount of pasture is produced that autumn, but where it is seeded alone in the spring a cutting of hay may be made in the autumn. The following year a hay crop and a seed crop, or two cuttings of hay if seed is not desired, are usually obtained. In the South, where seeded alone, two cuttings may be obtained the first year, and either two cuttings of hay and a seed crop or three cuttings of hay the second year. Where seeded alone in the North there is no danger of the hay becoming woody the first year, and for that reason it does not need to be cut until it has attained its largest growth in the fall.

SEED PRODUCTION.

In harvesting the seed it is important that the plants be cut before the seed is fully matured. One must watch the seed crop carefully and as soon as the lower racemes are dry and mature it is best to cut the crop. Even where it is mown and the seed flailed out, probably not more than three-fourths of the racemes should be allowed to fully mature. Most of the seed used by the northern growers at the present time is handled as hulled seed, while in the South it is generally utilized unhulled. Sweet-clover seed can be thrashed easiest by the ordinary thrashing machine, but if it is to be hulled a regular clover huller with special rasps is used. In semiarid and irrigated sections the hulls are so dry that an ordinary grain thrasher will remove most of them. Since the seed shatters very easily, sweet clover should be cut when it is wet with dew. If the first growth be clipped back to a height of 6 inches when it is

2 feet tall, the seed crop will come on much more evenly. Care should be taken to cut the stubble of the preceding hay crops as high as possible, so that there will be uncut stems remaining to resume growth, as this plant, unlike alfalfa, does not form new crown shoots. When the seed is flailed out or thrashed, the straw may be returned to the field, to be plowed under for fertilizer. Seed yields vary from 2 to 8 bushels to the acre.

ERADICATION.

The failure of the farmers throughout the United States to make use of this valuable legume has largely been on account of the fear that it could not be eradicated from their farms if once started. The biennial nature of the plant makes the problem of eradication very easy. It will not persist when continually mowed so that it can not produce seed, nor is it troublesome in clean cultivated or intertilled crops. Its appearance in grain or alfalfa fields, therefore, gives no reason for alarm, since the frequent cuttings of alfalfa will in a few years entirely destroy the sweet clover, and in the grain or corn fields the ordinary cultivation will suffice to kill it.

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